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Stormwater Management Manual for Eastern Washington



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Background Information



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Eastern Washington Stormwater Project

- In 1999, Ecology proposed a statewide stormwater manual
 - Local jurisdictions requested a separate manual for eastern WA; Ecology agreed
- Steering Committee formed in June 2001
- Hired a consultant Team





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Eastern Washington Stormwater Project

- Stakeholders worked together to develop regionally appropriate tools to manage stormwater
- Developed two new guidance documents for Eastern WA:
 - ◆ Model Municipal SW Program
 - ◆ Stormwater Management Manual



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Eastern Washington Stormwater Manual

■ 2001 – 2003:

- Monthly subcommittee meetings to develop first draft
- Public workshops and comment period in fall 2002
- About 925 comments received
- The document was substantially revised





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Eastern Washington Stormwater Manual

■ 2003 – 2004:

- Final Draft and second round of workshops and comments in summer 2003
- Subcommittee considered the comments and reviewed the changes made
- Final manual published in September 2004; eight free introductory workshops





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A Living Document

- This is the first comprehensive technical stormwater manual for all of eastern Washington
- Goal of the committee was to create an “80% document”
- We need your input to make it better for all to use



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A Living Document

- Send corrections, clarifications, and/or questions about the manual to Karen Dinicola at kdin461@ecy.wa.gov
- Corrections/updates are posted at: www.ecy.wa.gov/programs/wq/stormwater/eastern_manual/index.html#corrections



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Workshop Objectives and Agenda



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Workshop Objectives

- Understand goals and general procedures for development of SSPs
- Apply general procedures for preparation of SSPs using SWMMEW
- Gain understanding of SWMMEW's Core Elements and how to apply them to new development and redevelopment projects
- Answer questions; solicit feedback



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Today's Agenda

- **4 Basic Steps Framework for SSPs**
- **Apply 4 Basic Steps to 3 projects:**
 - Residential – Subdivision
 - Commercial – Drugstore
 - Roadway – Public Road
- **Prepare a Stormwater Site Plan**
- **Review a Stormwater Site Plan**
- **Next Steps; Wrap-up**



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SSP Workshop

Stormwater Site Plans (Core Element #1)



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Introduction to Chapter 2

- **2.1.1 - New Development**
- **2.1.2 - Redevelopment**
- **2.1.3 - Exemptions**
- **2.1.4 - Partial Exemptions**
- **2.1.5 - Local Exceptions and Variances**



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New Development and Redevelopment

- New development: conversion of undeveloped or pervious surfaces to impervious surfaces and managed landscape areas
- Redevelopment: replacement of impervious surfaces on a developed site, with exceptions for routine maintenance



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Chapter 3

Stormwater Site Plans

**Comprehensive Report
containing all of the technical
information and analysis for
regulatory agencies to evaluate
a proposed project for
compliance with stormwater
requirements.**



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4 Basic Steps Framework

- **Step 1 – Collect and Analyze Information on Existing Conditions**
- **Step 2 – Determine Applicable Core Elements**
- **Step 3 - Prepare a Permanent Stormwater Control Plan**
- **Step 4 – Prepare a Construction SW Pollution Prevention Plan**





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SSP – Step #1

Existing Conditions

- Topography
- Drainage Patterns
- Existing Soil and Ground Cover
- Critical/Sensitive/Flood Hazard Areas
- Adjacent Uses/Development
- Existing Stormwater Facilities
- Existing Utilities
- Site Limitations
- Downstream Analysis



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Pre-Developed, Existing, and Post-Developed Conditions

- Pre-Developed: native vegetation and soils that existed at a site prior to the influence of Euro-American settlement
- Existing: the impervious surfaces, drainage systems, land cover, vegetation and soils that exist at the site - point in time depends on terms under which surfaces/system constructed.
- Post-Developed: the impervious surfaces, drainage systems, land cover, vegetation and soils that will exist as a result of the proposed development activity.



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SSP – Step #2

Determine Applicable Core Elements

***** Chapter 2 – CORE ELEMENTS *****

CE #1 – Preparation of a Stormwater Site Plan

**CE #2 – Construction Stormwater Pollution
Prevention**

CE #3 – Source Control of Pollution

**CE #4 – Preservation of Natural Drainage
Systems**

CE #5 – Runoff Treatment ←

CE #6 – Flow Control ←

CE #7 – Operation and Maintenance

CE #8 – Local Requirements



CE #5 – Runoff Treatment

- This Core Element is required for all projects creating 5,000 SF or more pollutant-generating impervious surfaces (PGIS)
- Runoff treatment BMPs and selection process are described in Chapter 5





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Exemptions & Guidelines

CE #5 Runoff Treatment

- **Exemptions (p. 2-20+) for:**
 - Basic Treatment
 - Metals Treatment
 - Oil Treatment
- **Guidelines (p.2-21+) for:**
 - UIC Facilities
 - Basic Treatment
 - Metals Treatment
 - Oil Treatment
 - Phosphorus Treatment



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Guidelines (*cont'd*)

CE #5 Runoff Treatment

- **Guidelines (p.2-23+) for:**
 - **Treatment Facility Sizing**
 - **Bypass Requirements**
 - **Use of Existing Wetlands**
 - **Supplemental Guidelines**
 - **Responsibilities of Local Jurisdictions**



CE #5 – Runoff Treatment

- **Basic Treatment** requirement applies to all of these projects, unless the vadose zone below a drywell meets the requirements in Chapter 5.6 (*revision pending*)
- Basic treatment goal is removal of 80% of the solids in runoff





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CE #5 – Runoff Treatment

- **Metals Treatment** requirement applies to moderate-use and high-use sites (see definitions on p. 2-19) and sites identified on p. 2-22
- Discharges to groundwater and large surface water bodies are generally exempt from metals treatment requirement (p. 2-20)





CE #5 – Runoff Treatment

- **Oil Treatment** requirement applies to all high-use sites (see p. 2-19 and p. 2-22)
- Some sites require spill control type of oil control (see Ch. 8)
- See Chapter 5 for assistance in selecting proper BMPs





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CE #5 – Runoff Treatment

- **“Phosphorus Treatment”** requirement applies **only** to projects where federal, state, or local government has determined that a water body is sensitive to phosphorus and BMPs are needed to protect water quality



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CE #5 – Runoff Treatment

- Design storms: how much water needs to be treated?
- Treatment BMPs are sized based on either **volume** or **flow rate**; see p. 2-23
- The possible design storms are described in Chapter 4



CE #5 – Runoff Treatment

- For **volume**, local government to specify which of the following will be used in their jurisdiction:
 - 6-mo regional storm
 - 6-mo, 24-hr SCS Type IA
 - 0.5 inches of runoff from the site
 - 6-mo, 24-hr SCS Type II
- Defaults identified for 4 regions



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CE #5 – Runoff Treatment

- For **flow rate**, local government to specify which of the following will be used in their jurisdiction:
 - 6-mo short-duration storm
 - 6-mo, 24-hr SCS Type II
 - 2-yr MRI Rational Method
- Default identified
- Criteria differs if downstream from detention (see pg. 2-25)



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CE #6 – Flow Control

- Required for all sites with discharges to small streams, lakes or wetlands
- The 2-year runoff volume released at no more than 50% of the 2-yr pre-developed (existing peak) rate
- Purpose is to protect **habitat** by maintaining hydrology to the maximum extent possible



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CE #6 – Flow Control

- This Core Element does not address flooding; upper design flow rate may be amended by local jurisdiction
- Sizing requirements for drywells are determined by local jurisdictions; guidance is provided in Chapter 6



CE #6 – Flow Control

- Projects able to disperse flows are exempt (see Chapter 6.5)
- Direct discharges to large rivers and lakes are exempt (see p. 2-29 and supplemental guidelines)
- Streams that flow **ONLY** during runoff-producing events are exempt



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CE #6 – Flow Control

- The **pre-development** or **existing** condition is compared to the **proposed development** condition using the hydrologic analysis methods described in Chapter 4
- BMPs are designed according to guidance in Chapter 6



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SSP – Step #3

Permanent Stormwater Control Plan

- **Drainage Report**
 - **Drainage Report Checklist**
 - **Appendix 3B**
- **Construction Plans**
 - **Appendix 3C**

We will discuss these items in more detail in our examples and exercises today (copies available)



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SSP – Step #4

Construction Stormwater Pollution Prevention Plan (SWPPP)

- A SWPPP is comprised of:
 - Narrative
 - Drawings
- A SWPPP addresses the “12 Elements”
- A SWPPP is a required part of a complete SSP
- Coverage under a Construction Stormwater General Permit also requires a SWPPP (see p. 1-13 and Ecology’s stormwater website)



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SSP – Step #4

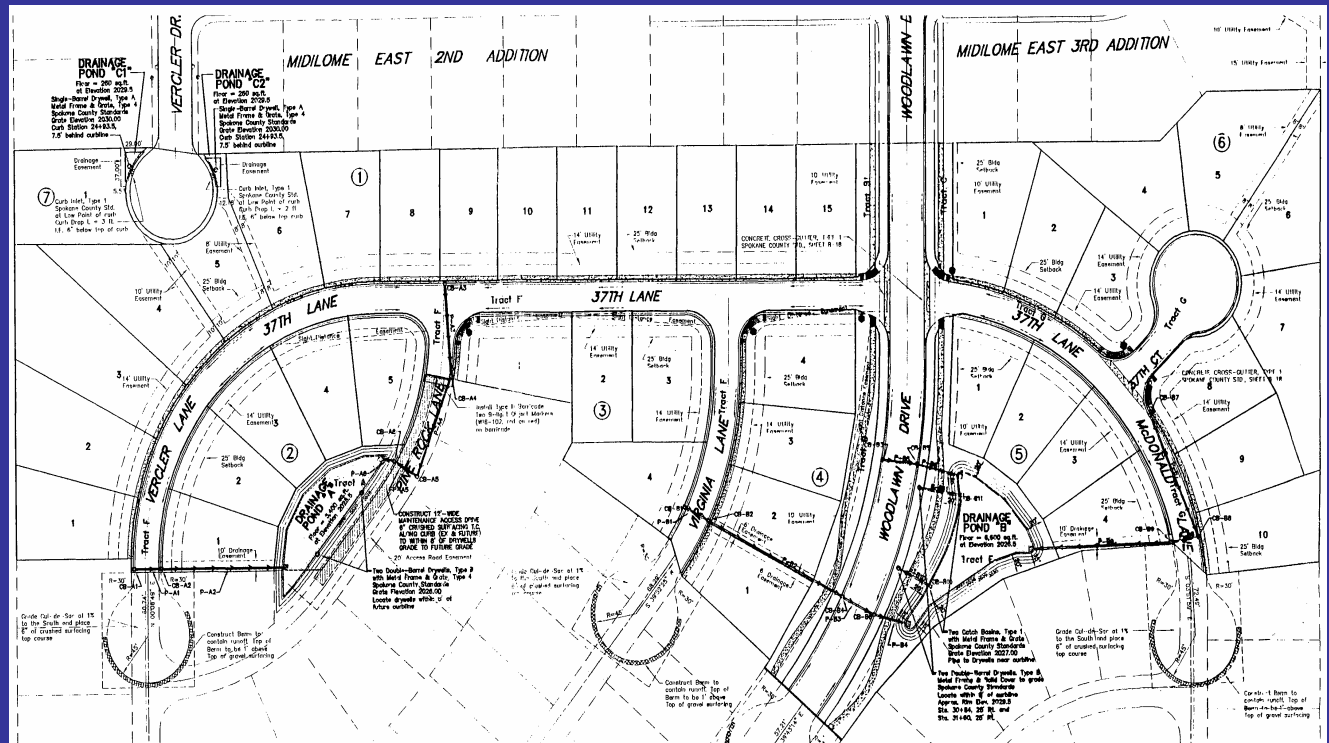
Construction Stormwater Pollution Prevention Plan (SWPPP)

■ The 12 Elements are:

- Mark Clearing Limits
- Establish Construction Access
- Control Flow Rates
- Install Sediment Controls
- Stabilize Soils
- Protect Slopes
- Protect Drain Inlets
- Stabilize Channels and Outlets
- Control Pollutants
- Control De-Watering
- Maintain BMPs
- Manage the Project



New Development Project RESIDENTIAL SUBDIVISION





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Project Overview

- **“Pine Desert P.U.D. – 1st Addition”**
[first of three planned phases]
- **Within City Limits of Phase II City**
- **43 SFR lots; 5 open tracts**
- **13.5 acres [first phase]**
- **Existing arterial on the north side**
- **Previous use – Farm field (treeless)**
- **Proposed use – Residential housing**
- **Site is generally level, but south portion slopes to the south**



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Step #1

Existing Site Conditions

- Topography – Slopes to South avg 1%
- Drainage Patterns
 - No natural streams or wetlands
 - Sheet and shallow flow generally to the South with natural infiltration
- Soil is Springdale gravelly sandy loam of significant depth and adequate drainage
- Over an Aquifer Sensitive Area
- Adjacent Uses – North: residential, West: junior high school; East and South: farmland



Step #1

Existing Site Conditions

■ Existing Stormwater Facilities

- Adjacent developments, roadways and school have separate on-site drainage systems
- One existing residence drains into area; will not be connected to the new drainage system
- All drainage is via infiltration to ground

■ Existing Utilities

- Within arterial rights-of-way – domestic water, sanitary sewer, storm drainage, natural gas, power, telephone, cable, street lighting
- On-site – farmland with no existing utilities

- **Downstream Analysis** – *no analysis is required for surface water, but site is over a sole-source drinking water aquifer (see Chapter 5.6 – UIC).*



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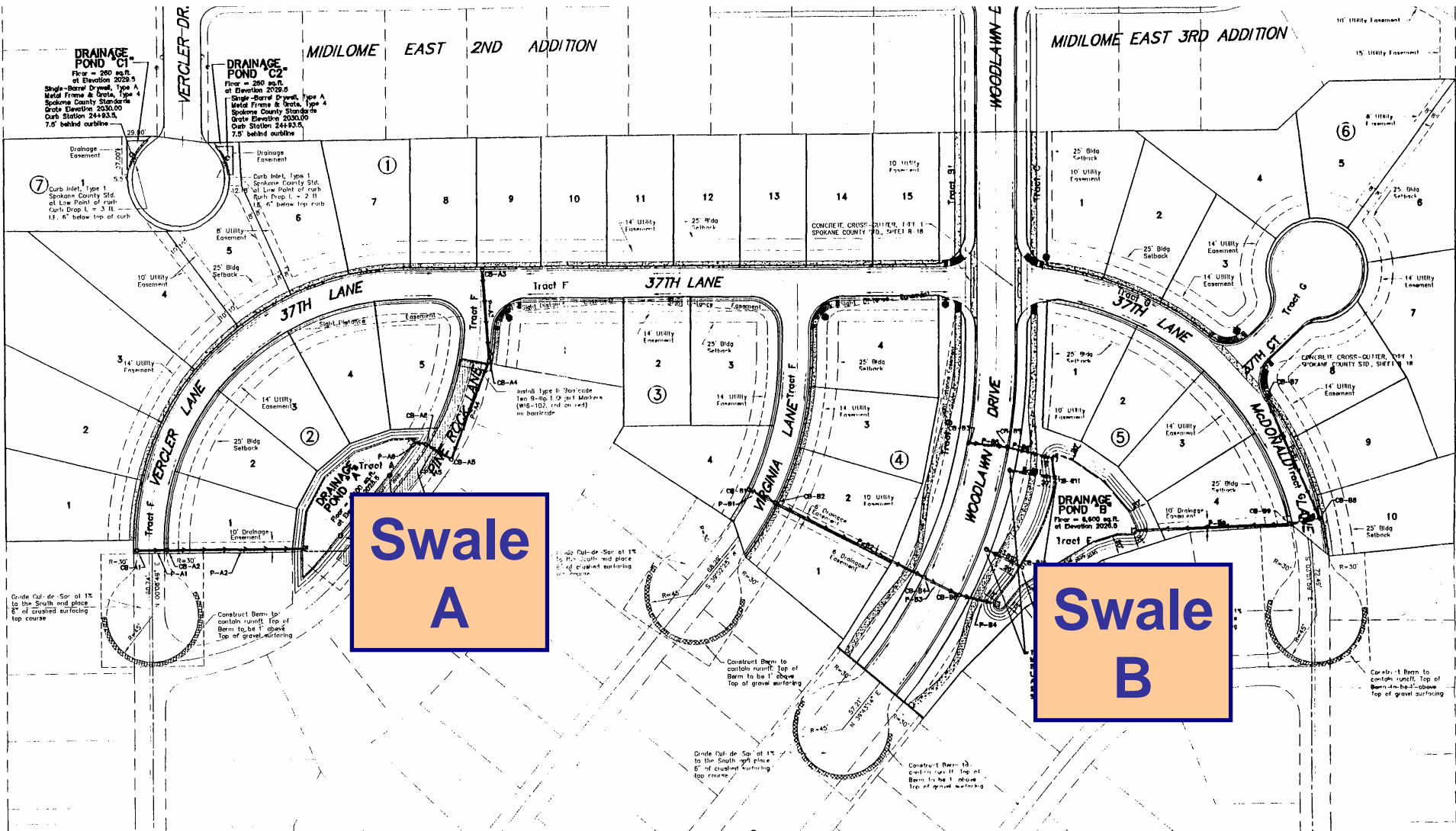
Proposed Improvements

- **“Pine Desert P.U.D. – 1st Addition”**
[13.5 ac; first of three planned phases]
- **43 SFR lots; 8,000 - 10,000 sq. ft.**
- **Retain all drainage within the P.U.D.**
- **5 open tracts: 2 open tracts for drainage swales; each serve about half of the area**
- **Pipe all drainage to the swales**
- **Swale overflow (beyond design storm quantity) goes to on-site drywells**



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Proposed Improvements





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Step #2

New Development

- **Converting previously undeveloped surface to impervious surface**
 - **137,000 SF – PGIS (3.1 ac)**
 - **454,000 SF – other (10.4 ac)**
- **Core Elements 1 - 4, 8 apply**
- **Core Element 5 thresholds met?**
- **Core Element 6 thresholds met? N/A**
- **CE 7 applies if CE 5 or CE 6 applies**
- **Core Element 8 requirements met?**



Guidelines

CE #5 Runoff Treatment

- **Metals Treatment** (surface water discharge)
 - Industrial Site: EPA 40CFR 122.26(b)(14)
 - Urban Road: 7,500 ADT
 - Rural Road: 15,000 ADT
 - Commercial/Industrial Site: (several specified trip ends and parking thresholds)
 - Metal Roofs: uncoated and leachable
- **Oil Treatment**
 - Required for high-use sites
- **Phosphorus Treatment**
 - Required where separately determined



Guidelines

CE #5 Runoff Treatment

■ Treatment Facility Sizing

- Grass Infiltration Swales
- Volume-based design sizing (p. 2-23)
- Region 3 Climate Zone (p. 2-24)
- Use Method 3 (0.5 inches of runoff)
- Snowmelt Considerations – not used

■ Bypass Requirements

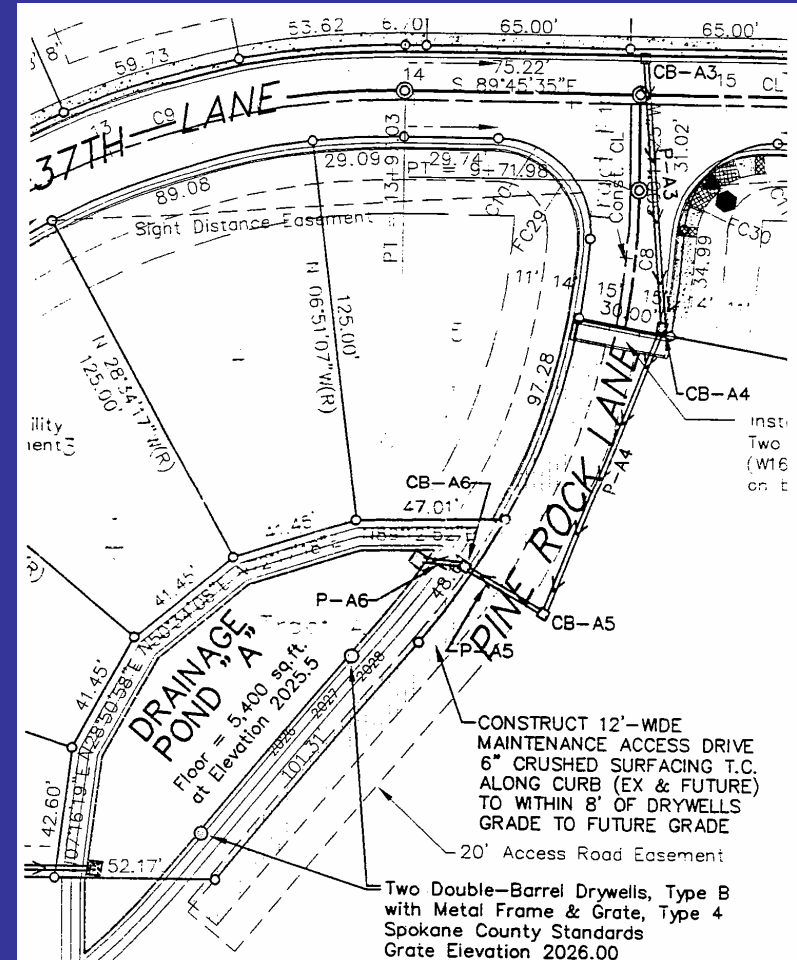
- Flow-rate-based design – used to size overflow drywells

■ Use of Existing Wetlands: not used



A scenic view of a large blue lake, likely Lake Urmia, surrounded by green hills and a clear blue sky. The lake is the central focus, with a small peninsula or island visible in the middle. The surrounding landscape is lush and green, with some buildings visible on the right side. The sky is a clear, bright blue with a few wispy clouds.

Area = 5,400 sq ft





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Treatment Swale B

(size constructed = 6,600 sq ft)

Impervious Surfaces:

Pavement = 1.05 ac

Sidewalks = 0.24 ac

Pathways = 0.14 ac

Roofs = 0.72 ac

Driveways = 0.17ac

Pervious Surfaces:

Landscaping = 3.93 ac

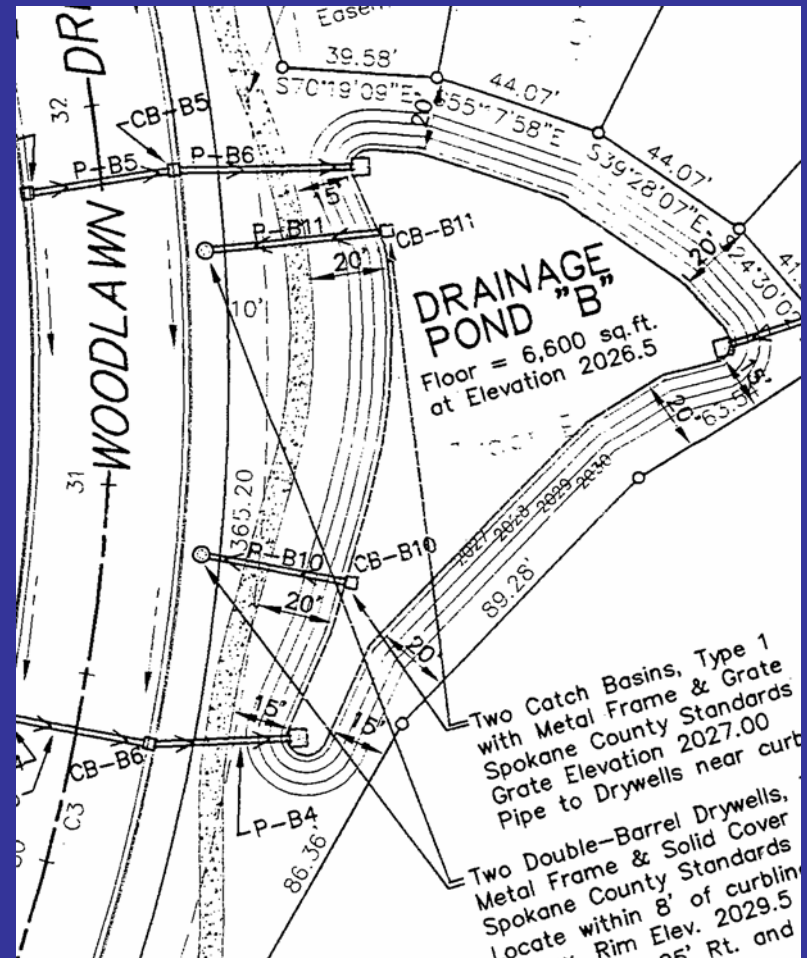
Treatment Area:

PGIS = 1.62 ac

Swale Size Required:

Volume = 3,000 cu ft

Area = 6,000 sq ft





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Step #3

Permanent Stormwater Control Plan

- **Drainage Report**
 - **Drainage Report Checklist**
 - **Appendix 3B**
- **Construction Plans**
 - **Appendix 3C**



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Step #4

Construction Stormwater Pollution Prevention Plan (SWPPP)

- The 12 Elements are:
- Mark Clearing Limits
 - Establish Construction Access
 - Control Flow Rates
 - Install Sediment Controls
 - Stabilize Soils
 - Protect Slopes
 - Protect Drain Inlets
 - Stabilize Channels and Outlets
 - Control Pollutants
 - Control De-Watering
 - Maintain BMPs
 - Manage the Project



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Application of 4 Steps

Redevelopment Project **DRUGSTORE**



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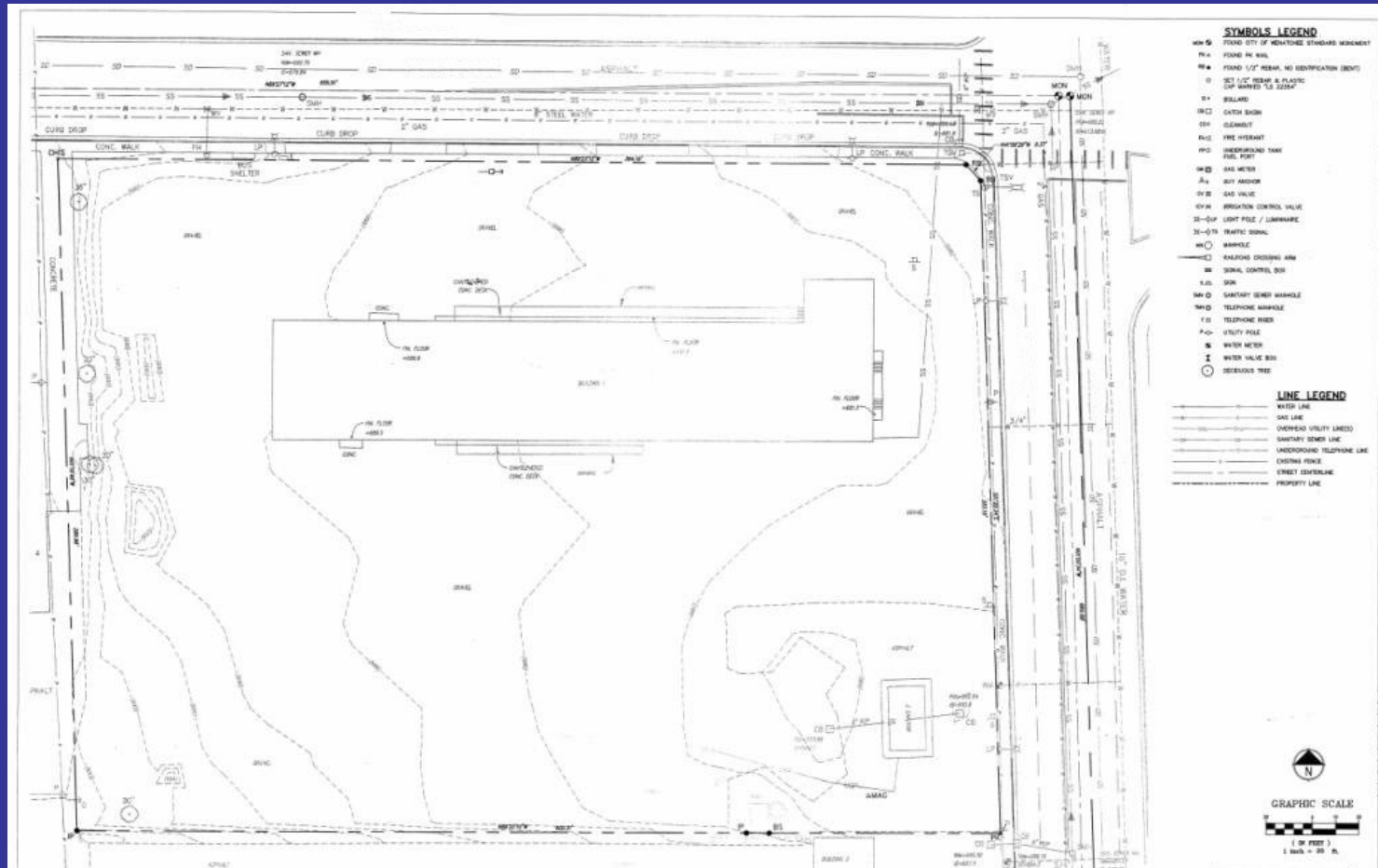
Project Overview

- **Within City Limits of Phase II City**
- **Commercial Zoning**
- **Corner Lot**
- **Adjacent roadways both arterials**
- **Intersection is signalized**
- **Previous use – Freight Distribution Hub**
- **Proposed use – Drugstore**



Step #1

Existing Site Conditions





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Step #1

Existing Site Conditions

- **Topography – Slopes to East ranges 5% to 1.5%**
- **Drainage Patterns**
 - **Sheet and Shallow Concentrated across site West to East**
 - **Runoff from westerly lot**
- **Existing 14,000 SF Warehouse; 450 SF Outbuilding; 9,100 SF of asphalt pavement; 92,000 SF of graveled area**
- **No Critical/Sensitive/Flood Hazard Areas**
- **Adjacent Uses – Retail Commercial**



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Step #1

Existing Site Conditions

■ Existing Stormwater Facilities

- Existing drywell in southeast for southerly area – drastically undersized, not maintained
- Runoff to right-of-way for northerly area
- Storm drains in both arterials, both ultimately discharge to surface water

■ Existing Utilities

- Within arterial rights-of-way – domestic water, sanitary sewer, storm drainage, natural gas, power, telephone, cable, street lighting
- On-site – domestic water service, sanitary sewer lateral



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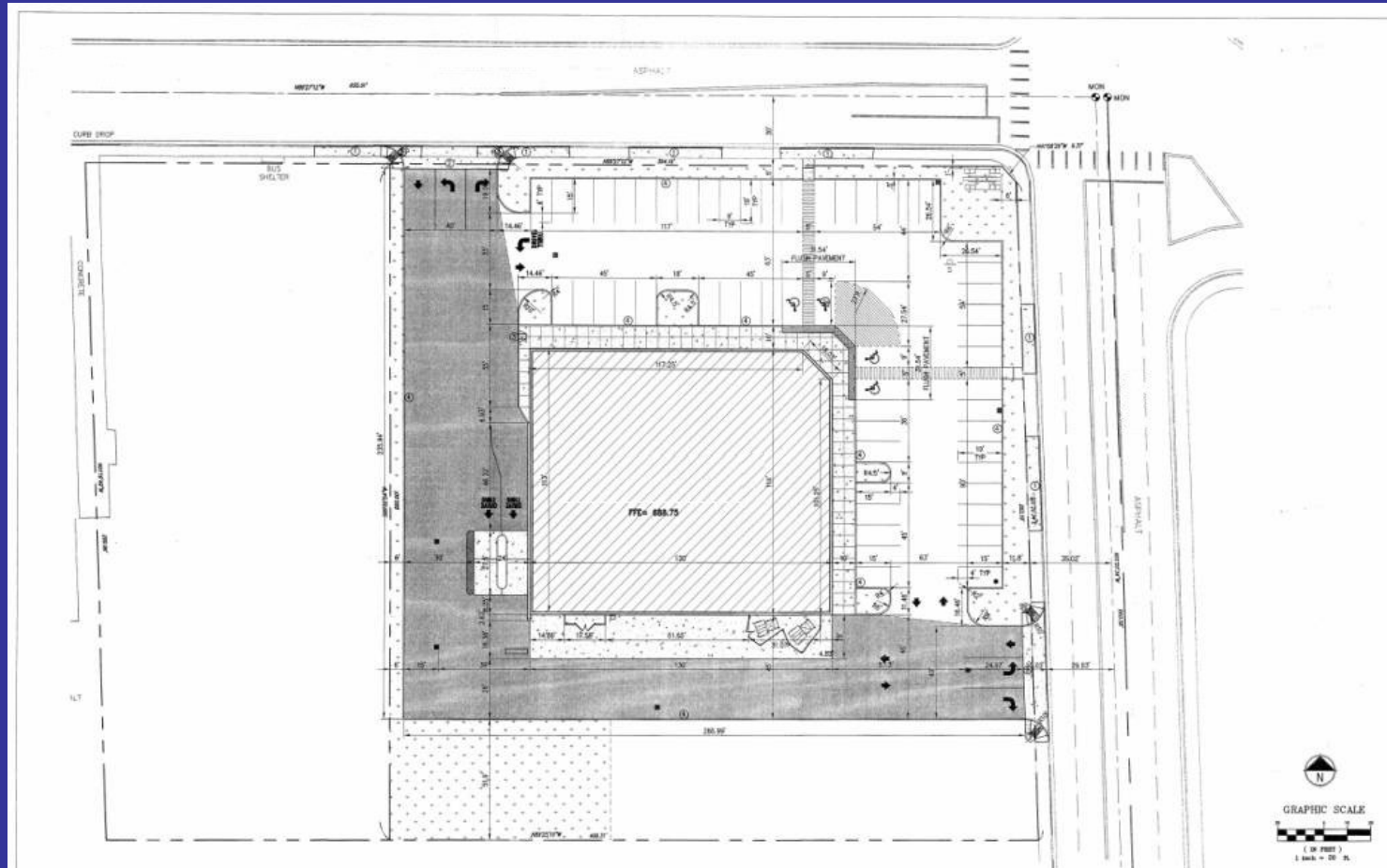
Step #1

Downstream Analysis

- **Downstream Analysis Study Area**
- **Review available information**
- **Field inspection of study area**
 - **Current situation results in unmitigated, untreated runoff to Cotton Ball Pkwy, storm drain for northerly portion of site**
 - **Undersized UIC facility results in ponding; no pre-treatment**
 - **Storm drain in Cotton Ball Pkwy – 21-inch CMP, no manholes along parcel**
 - **Storm drain in Sneezy Blvd – 42-inch CMP, no manholes along parcel**



Proposed Improvements





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Proposed Improvements

- 15,000 SF Drugstore – Commercial Retail
- 55 Trip Ends per 1,000 SF
- Asphalt surface for parking area; concrete for loading docks, walks
- Zoning requires managed landscaped buffers along arterials
- Desired building location and condition of existing asphalt will result in removal of the existing structure and all asphalt
- Desire to discharge to city's storm drainage system



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Step #2

New Development

- Entire site area functioned as impervious given prior use – New Development requirements do not apply to this project



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Step #2

Redevelopment

- Replacing all 115,000 SF impervious surfaces, 65,000 SF this phase
 - Entirety of replaced considered PGIS
- CE 1 – 4 and CE 8 apply to replaced impervious surfaces
- CE 2 and CE 3 apply to entire site affected by activities
- CE 5 applies to replaced PGIS IF thresholds are met, non-exempt
- CE 6 applies to all replaced impervious surfaces IF thresholds are met, non-exempt
- CE 7 applies if CE 5 or CE 6 applies
- Core Element 8 requirements?



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CE #3 Source Control

- **Considerations for structural separation of surfaces exposed to pollutants during design**
- **Selection of Source Control BMPs for implementation after construction**
 - **BMP for Landscaping and Lawn/Vegetation Management**
 - **BMP for Maintenance of Stormwater Drainage and Treatment Systems**
 - **BMP for Roof/Building Drains at Manufacturing and Commercial Buildings**



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CE #4 Preservation of Natural Drainage Systems

- **Maintain Natural Drainage Patterns**
- **Discharges at the natural location**
- **Preferred options for discharge of excess stormwater :**
 1. **Maintain dispersed sheet flow**
 2. **Infiltrate on-site**
 3. **Infiltrate off-site**
 4. **Discharge to existing ditch networks, canals, or other dispersal methods that allow groundwater recharge**





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CE #4 Preservation of Natural Drainage Systems

5. Discharge to wetlands, if allowed
6. Discharge to existing private or municipally owned stormwater systems, if allowed
7. Evaporate on-site or off-site
8. Create a new outfall for discharge to surface waters

- Investigate site limitations
- Discharge must not cause adverse impact to downgradient properties and downstream receiving waters
- Outfalls must address energy dissipation



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Redevelopment Thresholds

CE #5 Runoff Treatment

- **Do any of the following apply?**
 - **Industrial Site: EPA 40CFR 122.26(b)(14)**
 - **Commercial Site with outdoor storage**
 - **TMDL or Water Cleanup Plan**
 - **A High-Use Site per Chapter 2.2.5**
 - **An area subject to vehicular traffic under the following conditions:**
 - a) **Improves a soft shoulder to curb and gutter, ADT 7,500 or more**
 - b) **Replaces/improves parking area surface where trip ends exceed 40 per 1000 SF of bldg area or 100 total trip ends per day. Oil and Metals treatment req'd at 100 trips per 1000 SF of bldg area or 300 total trip ends per day.**



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Redevelopment Thresholds

CE #5 Runoff Treatment

- c) Project replaces/improves surface of an urban road where projected ADT is 7500 or more vehicles per day. Oil and metals treatment req'd if projected ADT is more than 30,000 vehicles per day.
- d) Project replaces/improves surface of a rural road, freeway, or highway with limited access control where projected ADT is 15,000 or more vehicles per day. Oil and metals treatment req'd if projected ADT is more than 30,000 vehicles per day.
- e) Project affects the area within 500 feet of a controlled intersection on a limited access control highway with a projected ADT of 7,500 or more vehicles per day.



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Exemptions & Guidelines

CE #5 Runoff Treatment

- **Exempt from (p. 2-20+):**
 - **Metals Treatment**
- **Review Guidelines (p.2-21+):**
 - **Basic Treatment**
 - **Oil Treatment**
 - **Treatment Facility Sizing**
 - **Bypass Requirements**



Guidelines

CE #5 Runoff Treatment

■ Oil Treatment

- Separator Technology Req'd this site (see clarification issued Feb 05)

■ Treatment Facility Sizing

- Flow rate-based design sizing (p. 2-24)
- Region 2 Climate Zone (p. 2-24)
- Default Method 2 (SCS Type II, 6-mo)
- Snowmelt Considerations – not used

■ Bypass Requirements

- Flow-rate-based design



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Redevelopment Thresholds

CE #6 Flow Control

- CE #6 shall apply to all of the replaced impervious surfaces at the site **if** required by the state, federal, or local jurisdiction based on flooding studies or habitat assessments



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Step #3

Permanent Stormwater Control Plan

- **Drainage Report**
 - **Drainage Report Checklist**
 - **Appendix 3B**
- **Construction Plans**
 - **Appendix 3C**



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Step #3

Permanent Stormwater Control Plan

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Appendices

Appendix A – Hydrologic Computations/Calculations
Appendix B – Hydraulic Calculations
Appendix C – Traffic Analysis
Appendix D – Permission to Discharge to Publicly Owned System, Design Criteria
Appendix E – Source Control BMPs
Appendix F – O&M Information

A. Project Overview

The proposed Drugstore is a redevelopment project on the corner lot lying at the intersections of Cotton Ball Parkway and Sneezy Boulevard within the city limits of Somewhere, WA. The prior use of the existing improvements on this lot was as a freight distribution hub. This redevelopment is the first phase of activities on land assembled and ready for redevelopment at this intersection. The project will occur on lands within the city's Commercial zoning.

B. Existing Conditions Summary

The existing lot is approximately 2.6 acres in size, and is a corner lot located in the southwest corner of the intersection of Cotton Ball Pkwy and Sneezy Blvd, both designated as arterials. The site is relatively flat, and from the toe of a cut slope at the west edge, it falls to the east at an average slope of 2 percent.

Currently, the drainage on-site flows to the north and south due to the existing building orientation. Drainage to the north of the building is sheet and shallow concentrated flow which enters the Cotton Ball Pkwy right-of-way. Drainage to the south of the building is in sheet or shallow concentrate flow which ponds at a lowpoint at which there is a drywell.

The lot to the west contributes runoff to the site from parking and circulation surfaces for which a collection system does not exist. It is estimated that this area contributing runoff is approximately 3,000 SF in size, and the runoff is sheet flow. Runoff reaching the public right-of-way is currently discharged to a secondary pipe in the city's Happy Flats basin, which ultimately discharges to the Big River approximately 1.5 miles downstream. The Downstream Analysis Report can be found in Section E of this report.

Aside from the 14,000 SF of warehouse, an outbuilding with less than 1,000 SF floor area, and a small percentage is covered in asphalt, the remainder of the lot covered in gravel. Soils are categorized as NRCS/SCS Hydrologic Group B soils based on the Soils Survey for Somewhere County, WA. Preparation of the site for this tenant will require demolition of existing structures and removal of existing surfaces.

No Critical, Sensitive, or Flood Hazard areas have been determined to be within the limits of or adjacent to the project.

The neighboring uses on all sides and across both arterials are of commercial retail or commercial wholesale nature.

C. Proposed Improvements Summary

The proposed development of this land into the commercial retail use of a drugstore is to occur on approximately 1.5 acres of the 2.6 acres available. The developer has assembled adjacent parcels and plans to process boundary line adjustments to cater to future tenants. Please see the Proposed Site Plan for the location of the proposed parcel boundary.

The proposed gross floor area of the building footprint is 15,000 SF. The project will replace all of the existing impervious surfaces currently existing on the site. All of the surfaces are considered PGIS given desired surfaces, use and anticipated maintenance practices. Projected trip ends are 55 trip ends per 1,000 SF of gross floor area or 825 trip ends per day. Please see the Traffic Analysis in the appendix for additional information.

This project proposes to provide water quality treatment as required in the Stormwater Management Manual for Eastern Washington (SWMMEW) on-line and prior to discharging runoff to the city's conveyance system. Analysis and further discussion of the improvements can be found under Sections G and I of this report.

[illegible]



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Step #4

Construction Stormwater Pollution Prevention Plan (SWPPP)

- The 12 Elements are:
- Mark Clearing Limits
 - Establish Construction Access
 - Control Flow Rates
 - Install Sediment Controls
 - Stabilize Soils
 - Protect Slopes
 - Protect Drain Inlets
 - Stabilize Channels and Outlets
 - Control Pollutants
 - Control De-Watering
 - Maintain BMPs
 - Manage the Project



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Application of 4 Steps

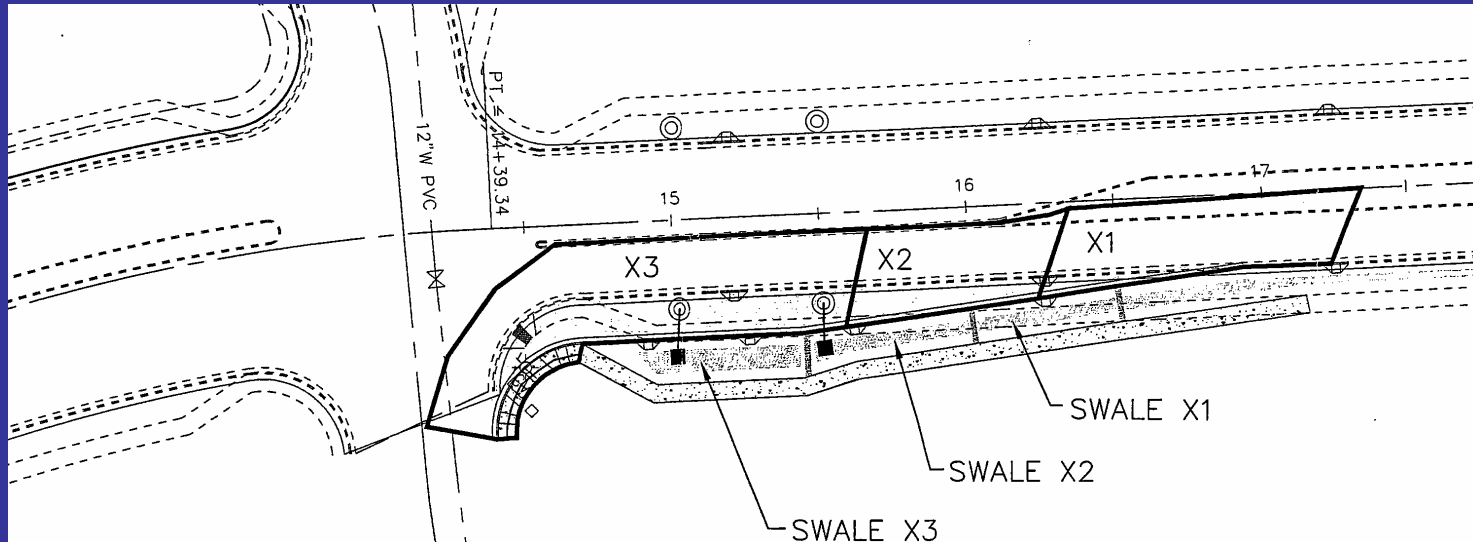
New Project ROADWAY



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Project Overview

- “Miracle Boulevard Merge Lane”
- Urban roadway: 8,500 ADT projected
- Adjacent land use – Commercial





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Step #1

Existing Site Conditions

- **Topography – Roadway widens into a low point with no surface outlet**
- **Drainage Patterns**
 - **No natural streams or wetlands**
 - **Sheet and shallow flow generally to the South with natural infiltration**
- **Soil is Garrison gravelly loam of significant depth and adequate drainage**
- **No Critical/Sensitive/Flood Hazard Areas (none mapped)**



Step #1

Existing Site Conditions

■ Existing Stormwater Facilities

- Existing swale alongside roadway with 2 overflow drywells in the swale; drywells will be covered by asphalt for merge lane
- All drainage is via infiltration to ground

■ Existing Utilities

- Within arterial rights-of-way – domestic water, sanitary sewer, storm drainage, natural gas, power, telephone, cable, street lighting

■ Downstream Analysis – *no analysis is required for surface water, but site is over a sole-source drinking water aquifer (see Chapter 5.6 – UIC).*



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Proposed Improvements

- “Miracle Boulevard Merge Lane”
- 125’ length X approx. 15’ width
- Retain all drainage within R/W
- Control drainage flows along curb to multiple surface inlets into swale
- Swale overflow (beyond design storm quantity) goes to existing drywells



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Step #2

New Development

- Converting previously undeveloped surface to impervious surface
 - no NPGIS
 - 1,200 SF of new PGIS
 - 8,800 SF of existing PGIS
- Core Elements 1 – 4, 8 apply
- Core Element 5 thresholds met?
- Core Element 6 thresholds met? N/A
- CE 7 applies if CE 5 or CE 6 applies
- Core Element 8 requirements met?



Special Considerations

Core Element # 8 – Local Requirements

- Not over a sole source aquifer, but County requires treatment based upon groundwater contamination potential
- Existing drywells about 20 years old; operating adequately, however County requires 100% storage of 10-year storm to minimize flooding potential



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Guidelines

CE #5 Runoff Treatment

- **Metals Treatment** (surface water discharge)
 - Industrial Site: EPA 40CFR 122.26(b)(14)
 - Urban Road: 7,500 ADT ←
 - Rural Road: 15,000 ADT
 - Commercial/Industrial Site
 - Metal Roofs: uncoated and leachable
- **Oil Treatment**
 - Not a high-use site (> 25,000 ADT)
- **Phosphorus Treatment**
 - Not required



Guidelines

CE #5 Runoff Treatment

■ Treatment Facility Sizing

- Grass Infiltration Swale
- Volume-based design sizing (p. 2-23)
- Region 2 Climate Zone (p. 2-24)
- Use Method 3 (0.5 inches of runoff)
- Snowmelt Considerations – not used

■ Bypass Requirements

- County requires greater swale volume; excess overflow goes to drywells

■ Use of Existing Wetlands: not used



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Treatment Swale

(size constructed = 1,000 sq ft)

Impervious Surfaces:

Pavement = 9300 SF

Sidewalks = 700 SF

Pervious Surfaces:

Landscaping = 0 SF

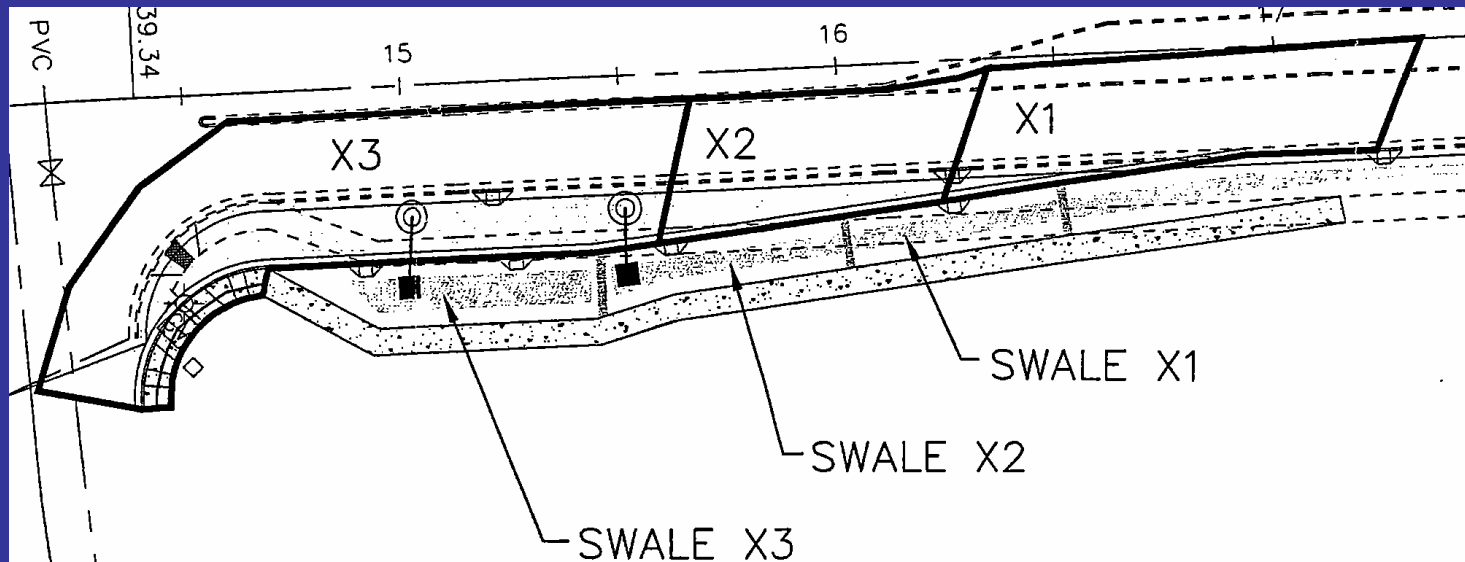
Treatment Area:

PGIS = 10,000 SF

Swale Size Required:

Volume = 420 cu ft

Area = 840 sq ft





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What If ?

- No infiltration was feasible/allowed?
- Discharge was to a sensitive area?
- Discharge was to a non-exempt surface water?
- The traffic count was less?
- The widening was for a bike lane?



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Step #3

Permanent Stormwater Control Plan

- **Drainage Report**
 - **Drainage Report Checklist**
 - **Appendix 3B**
- **Construction Plans**
 - **Appendix 3C**



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Step #4

Construction Stormwater Pollution Prevention Plan (SWPPP)

The 12 Elements are:

- Mark Clearing Limits
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Exercise 1

PREPARATION of a Stormwater Site Plan



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SSP Preparation Exercise

- **Select the following:**
 - Spokesperson
 - Recorder
 - Keeper of the Manual
 - Facilitator
- **Working in modules corresponding with 4 Basic Steps**
- **Be prepared to discuss/share:**
 - Existing Condition Summary
 - Application of the Core Elements
 - Permanent Stormwater Control Plan Drainage Report/Plan Contents



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Step #1

Existing Site Conditions

- Topography
- Drainage Patterns
- Existing Soil and Cover
- Critical/Sensitive/Flood Hazard Areas
- Adjacent Uses
- Existing Stormwater Facilities
- Existing Utilities
- Site Limitations
- Downstream Analysis



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Step #1 Recap



















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Step #2

Determine/Apply Core Elements

- What areas do Core Elements for New Development apply?
- What areas do Core Elements for Redevelopment apply?
- Exemptions/Variations?
- Approach to CE #4?
- Level of Runoff Treatment req'd?
- Is Flow Control req'd?



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Step #2 Recap



















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Step #3

Permanent Stormwater Control Plan

- Develop Table of Contents for Drainage Report
- Construction Plans Index



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Step #3 Recap



















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Step #4

Construction Stormwater Pollution Prevention Plan (SWPPP)

- A SWPPP is comprised of:
 - Narrative
 - Drawings
- A SWPPP addresses the
“12 Elements”



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Summary and Feedback SSP Prep Exercise

- **Applied 4 Basic Steps Framework to a New Development Project**
- **Discussion?**
- **Questions?**
- **Use Comment Form to provide additional questions and/or feedback**



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Exercise 2

REVIEW of a Stormwater Site Plan



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SSP Review Exercise

- Choose a:
 - Spokesperson
 - Recorder
 - Keeper of the Manual
 - Facilitator
- Review the SSP Materials
- Remember the 4 Steps and Core Elements
- Be prepared to share your comments to develop an SSP review letter



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SSP Review Recap

- **Share your comments for an SSP review letter:**
 - Existing Conditions Summary
 - Application of Core Elements
 - Permanent Stormwater Control Plan
 - SWPPP



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Summary & Wrap-up

Stormwater Site Plans Workshop



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QUESTIONS?